

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-346/82-25

Docket No. 50-346

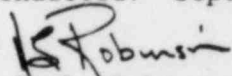
License No. NPF-3

Licensee: Toledo Edison Company
Edison Plaza
300 Madison Avenue
Toledo, OH 43652

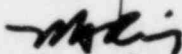
Facility Name: Davis-Besse Nuclear Power Station, Unit 1

Inspection At: Davis-Besse Site, Oak Harbor, OH

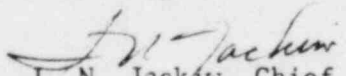
Inspection Conducted: September 15, 29-30, 1982

Inspectors: 
D. L. Robinson

12-1-82


M. A. Ring

12-6-82

Approved By: 
I. N. Jackiw, Chief
Test Programs Section

12-6-82

Inspection Summary

Inspection on September 15, 29-30, 1982 (Report No. 50-346/82-25)

Areas Inspected: Routine, announced inspection of previously identified inspection items; control rod drop time tests; control rod drive and position indication checks; reactor thermocouple/RTD calibration; incore/excore calibration; core power distribution limits; core thermal power evaluation; control rod worth measurements; reactor shutdown margin determination; isothermal temperature coefficient measurement; determination of reactivity anomalies. The inspection involved a total of 40 inspector-hours onsite by two NRC inspectors including 0 inspector-hours off-shifts.

Results: Of the eleven areas inspected, one item of noncompliance was identified (inadequate 50.59 review - Paragraph 6).

DETAILS

1. Persons Contacted

- *S. Quennoz, Assistant Station Superintendent
- *T. Powers, Administrative Coordinator
- *D. Dibert, Nuclear and Performance Engineer
 - A. Smith, Computer Systems Supervisor
- *D. Eshelman, Nuclear Engineer
- *C. Berger, Nuclear Engineer
 - M. Horne, Babcock & Wilcox Engineer
 - B. Guthrie, Babcock & Wilcox Engineer
- *J. Byrne, Quality Assurance Auditor
- *W. Rogers, USNRC Resident Inspector

*Denotes those attending the exit interview. The inspectors also contacted other members of the licensee's technical and administrative staff.

2. Licensee Action on Previous Inspection Findings

(Closed) Item of Non-compliance (346/82-07-01): The inspector reviewed the licensee's response dated July 27, 1982, noted that a safety evaluation was submitted to Region III on May 17, 1982 and concluded that the corrective action taken was sufficient to prevent recurrence.

(Closed) Open item (346/82-13-01): The item involved determination of the specific mechanism resulting in damage to the auxiliary feedwater header.

References:

- a. Memo R. Spessard to D. Eisenhut, "Transfer of Responsibility - Davis-Besse Steam Generator Auxiliary Feedwater Header Damage," April 21, 1982.
- b. Task Interface Agreement, "Davis-Besse/Rancho Seco/Oconee 3 Steam Generator Auxiliary Feedwater Header Damage," June 3, 1982.
- c. "Safety Evaluation Report (SER) - Once Through Steam Generator," transmitted via letter G. Lainus to R. Crouse, August 20, 1982.

In accordance with references a. and b. above, responsibility for review of the mechanism resulting in damage to the auxiliary feedwater header was transferred to the Office of Nuclear Reactor Regulation (NRR). NRR reviewed the licensee's submittals dated July 15 and 30 and August 6 and 16, 1982 containing the licensee's conclusions regarding the mechanism for damage to the auxiliary feedwater header. The licensee concluded that rapid condensation-induced high pressure differential was the most likely cause of damage. The licensee also stated that other mechanisms such as thermal stresses due to cold AFW

flow and impingement velocity due to high AFW flow were considered. NRR provided agreement with the licensee's assessment in reference c. The inspector also reviewed the licensee's submittals of July 15 and August 6, 1982 as well as reference c. Based on the above discussion, the item is considered closed.

(Closed) Open item (346/82-13-02): The item involved the determination of corrective action to repair, replace or modify the auxiliary feedwater system. Similar to open item 346/82-13-01 discussed above, responsibility for the modification and repair was also transferred to NRR. The same submittals and SER referenced above addressed this open item and were reviewed by the inspector. Additionally, the inspector reviewed data from the AFW flow verification test (previously examined by DPRP). The inspector considers this item closed.

3. Verification of Conduct of Startup Physics Testing

The inspectors reviewed the startup physics testing for Cycle 3 and verified that the licensee had conducted the following:

- a. Rod Drive and Rod Position Indication Checks
- b. Reactor Thermocouple/RTD Calibration
- c. Core Power Distribution Limits
- d. Core Thermal Power Evaluation
- e. Incore/Excore Detector Calibration
- f. Control Rod Worth Measurement
- g. Reactor Shutdown Margin Verification
- h. Isothermal Temperature Coefficient Measurement
- i. Determination of Reactivity Anomalies

4. Control Rod Drive and Position Indication Checks

The inspectors reviewed the results of surveillance test ST 5013.02, "Control Rod Assembly Test," for Cycle 3 and noted that all rod drop times satisfied the acceptance criteria of 1.58 seconds or less required by the Technical Specifications. The inspectors also verified that rod drive and rod position indication checks had been performed in accordance with surveillance test ST 5013.03, "Control Rod Program Verification."

No items of noncompliance or deviations were identified.

5. Reactor Thermocouple/RTD Calibration

The inspectors reviewed information related to reactor thermocouple/RTD calibration as described in surveillance tests ST 5010.03, "RTD and Incore Thermocouple Normalization," and ST 5030.60, "RCS Temperature Input to RPS Refueling Period Calibration." The inspectors noted that although the RTDs dedicated to the Reactor Protection System (RPS) were subject to specific acceptance criteria, those designated for nonnuclear instrumentation input to the Integrated Control System (ICS) were not. Moreover, the inspectors noted that two of these loop RTDs were effectively inoperable due to dissimilar operating characteristics. The licensee acknowledged the inspectors' concern and stated that this condition would be corrected when suitable replacements became available. The absence of specific review and acceptance criteria for ICS instrumentation is considered an open item (50-346/82-25-01) pending additional inspector review.

No items of noncompliance or deviations were identified.

6. Core Power Distribution Limits

On September 15, 1982 the inspectors met with members of the licensee's technical staff and B&W representatives to discuss circumstances surrounding the unexpected quadrant power tilt observed during Cycle 3 low power physics testing. The licensee stated that part of the tilt was attributable to computational difficulties encountered with the installation of a new computer system and that the software problems, once identified, were corrected and test results independently verified by the NSSS vendor. The inspectors noted that the licensee had reduced the indicated tilt by overfeeding one of the steam generators and was resuming startup physics testing while continuing to investigate possible cause(s) for the tilt.

On September 29-30, 1982 the inspectors returned to the site to review the Cycle 3 startup physics test results. The licensee stated that the core power tilt was apparently caused by cross-core shuffling of the fuel in addition to a feedwater flow and temperature mismatch between loops A and B; a conclusion that was later substantiated in a B&W letter from D. M. Rainey to T. D. Murray dated October 5, 1982.

The inspectors noted that cross-core shuffling had produced pronounced tilts at other B&W facilities in the past; moreover, the licensee had amended its test program in a letter from R. P. Crouse (TECo) to T. M. Novak (NRR) dated July 16, 1980 deleting control rod symmetry requirements on the pseudo-ejected rod worth measurements primarily on the justification that cross-core shuffling had been eliminated. The inspectors concluded that failure to consider the consequences of cross-core shuffling in the reload analysis constitutes an inadequate 50.59 review and is considered an item of noncompliance (50-346/82-25-02).

On October 27, 1982 Region III was informed that the licensee's quadrant power tilt in the WX quadrant had exceeded its Technical

Specification steady state limit by approximately 0.2% on September 28, 1982. The inspectors noted that despite their presence at the site on September 28-30, 1982 the licensee did not discuss this occurrence with the regional inspectors or the resident staff. Subsequent investigation indicated that the licensee had not considered the event significant enough to mention. The inspectors were nonetheless concerned about the licensee's candidness with regard to the subject inspection area.

7. Core Thermal Power Evaluation

The inspectors reviewed information related to the evaluation of core thermal power as determined by the onsite computer calorimetric and by hand calculation as described in surveillance test ST 5030.01, "RFS Daily Heat Balance Check." The inspectors verified that the onsite computer program was working properly and that the core thermal power calculated with the above procedure was in good agreement with that determined by the computer.

No items of noncompliance or deviations were identified.

8. Incore/Excore Detector Calibration

The inspectors reviewed information related to the incore/excore detector calibration as described in performance test PT 5175.01, "Power Imbalance Detector Correlation Test." The inspectors noted that some of the excore to incore detector current ratios did not meet the licensee acceptance criteria and required adjustment of their scaled differential amplifier gains. The inspectors verified that those adjustments had been made but noted that no retest was conducted to verify that the acceptance criteria had been met. The licensee stated that it considered a retest unwarranted.

No items of noncompliance or deviations were identified.

9. Control Rod Worth Measurement

The inspectors reviewed information related to Cycle 3 determination of control rod worth as described in surveillance test ST 5010.03, "Rod Worth Determination via Boron Swap." The inspectors verified that rod worth measurements met the licensee's acceptance criteria in that the individuals bank worths of groups 5, 6, and 7 were within 15% of design and the summation of groups 5, 6, and 7 were within 10% of design. The inspectors noted that the licensee did not measure the shutdown banks, groups 1 through 4.

No items of noncompliance or deviations were identified.

10. Shutdown Margin Verification

The inspectors reviewed information related to Cycle 3 determination of reactor shutdown margin and noted that the calculated value of 2.44% $\Delta K/K$ met the licensee's acceptance criteria of 1% $\Delta K/K$ with the most reactive control rod stuck out of core. The inspectors examined

the results of the pseudo ejected rod worth measurement as described in enclosure 15 of surveillance test ST 5010.03, "Ejected Rod Worth Measurement," and noted that symmetric rod pulls were not conducted despite a pronounced core power tilt.

No items of noncompliance or deviations were identified.

11. Isothermal Temperature Coefficient

The inspectors reviewed information related to Cycle 3 determination of the temperature coefficient of reactivity as described in enclosure 13 of surveillance test ST 5010.03. The licensee's acceptance criteria requires that the measured temperature coefficients be within ± 40 $\mu\text{p}/^\circ\text{F}$ of the predicted values and the moderator coefficient be less than 0.9×10^{-4} $\Delta\text{K}/\text{K}/^\circ\text{F}$ whenever thermal power is less than 95% rated. The inspectors determined that these requirements were met.

No items of noncompliance or deviations were identified.

12. Determination of Reactivity Anomalies

The inspectors reviewed information related to the determination of reactivity anomalies for Cycle 3 as described in surveillance test ST 5010.01, "Reactivity Anomalies," and surveillance data taken during Cycle 2. The inspector verified that the critical boron concentration was within 1% $\Delta\text{K}/\text{K}$ of the predicted value throughout the cycle and that the procedure had been performed at least once every 31 effective full power days in accordance with Technical Specification requirements.

No items of noncompliance or deviations were identified.

13. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on September 30, 1982. The inspectors summarized the purpose, scope, and findings of the inspection.